

CLAIMS

1. A vehicle body compartment lid comprising:

a unitary panel having an outer panel portion and an inner panel portion;
wherein the panel is sufficiently bent between the inner panel portion and the outer panel
5 portion such that the inner panel portion and the outer panel portion are in juxtaposition
with one another.

2. The vehicle body compartment lid of claim 1, wherein the inner
panel portion is characterized by an inner panel periphery and the outer panel portion is
characterized by an outer panel periphery, and wherein at least a portion of the inner
panel periphery and the outer panel periphery abut one another.

3. The vehicle body compartment lid of claim 1, wherein the panel is
formed by quick plastic forming.

4. The vehicle body compartment lid of claim 1, wherein the panel is
formed by superplastic forming.

5. The vehicle body compartment lid of claim 1, wherein the panel is
formed by sheet hydroforming.

6. A vehicle body compartment lid comprising:

a unitary panel characterized by a crease located between a first portion of
the panel and a second portion of the panel; wherein the first portion and the second
5 portion are in juxtaposition with one another such that the first portion functions as a
structural member to support the second portion, and the second portion is configured to
partially define the exterior surface of a vehicle.

7. The vehicle body compartment lid of claim 6, wherein the panel is characterized by a surface on one side of the panel; wherein a first portion of the surface is that part of the surface on a first side of the crease and a second portion of the surface is that part of the surface on a second side of the crease; and wherein the first portion of
5 the surface and the second portion of the surface substantially oppose one another.

8. The vehicle body compartment lid of claim 6, wherein the panel is formed by quick plastic forming.

9. The vehicle body compartment lid of claim 6, wherein the panel is formed by superplastic forming.

10. The vehicle body compartment lid of claim 6, wherein the panel is formed by sheet hydroforming.

11. The vehicle body compartment lid of claim 6, wherein the panel is comprised of a plastic material.

12. A method of manufacturing a vehicle body compartment lid, the method comprising:

providing a unitary panel having a first portion formed as a vehicle body
5 compartment lid outer panel and a second portion formed as a vehicle body compartment lid inner panel; and

bending the panel to form a crease between the first portion and the second portion.

13. The method of claim 12, further comprising subjecting a metal sheet to fluid pressure to form the unitary panel.

14. The method of claim 13, wherein the panel is characterized by a periphery, and wherein a first segment of the periphery is that part of the periphery on a first side of the crease and a second segment of the periphery is that part of the periphery on a second side of the crease; and wherein said bending the panel includes bending the
5 panel sufficiently such that at least a portion of the first segment substantially continuously abuts at least a portion of the second segment.

15. The method of claim 14, further comprising joining the first portion to the second portion along at least part of the first segment and the second segment.

16. The method of claim 12, wherein the method further comprises forming a sheet to produce the panel; wherein said forming the sheet includes placing the sheet in its substantially unformed, flat state between first and second die members movable between a die open position, for insertion of said sheet in its flat state and
5 removal of the formed panel, and a die closed position in which said dies sealingly engage the periphery of said sheet for stretch forming of the die enclosed area of the sheet utilizing differential gas pressure, said first die member having a forming surface and defining a cavity between said forming surface and a first surface of said sheet, said second die having a sheet metal shaping surface opposite said cavity, said dies being in
10 said die open position and said sheet being positioned between said preform surface and said cavity;

heating said sheet to a stretch forming temperature;

15 moving said dies to their closed position such that said first die engages

the periphery of said sheet and pulls the heated sheet against said second die shaping surface to draw sheet material into said cavity so that said sheet is no longer flat and more sheet material is disposed within its sealingly engaged periphery than if the sheet had remained flat; and

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applying gas pressure to the second side of said sheet to stretch the sheet into conformity with said first die forming surface.

17. The method of claim 16, wherein said sheet is comprised of an aluminum alloy.

18. The method of claim 17, wherein said sheet is superplastic formable and is heated to a superplastic-forming temperature before or during die closure.

19. The method of claim 12, wherein the method further comprises forming a sheet to produce the panel, wherein the sheet is comprised of a magnesium-containing, aluminum alloy, said alloy comprising up to about 6% by weight magnesium and having a microstructure characterized by a grain size in the range of about 5 to 30 micrometers, and wherein said forming the sheet includes heating said sheet to a temperature in the range of about 400° C. to about 510° C.; and

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stretching at least a portion of the heated sheet so that one side of the sheet is brought into conformance with a shaping surface by applying working gas pressure to the opposite side of the sheet, said stretching being accomplished by continually increasing said pressure from ambient pressure to a final stretching pressure in the range of about 250 psi to about 500 psi above ambient pressure and completing said stretching within a period of up to about 12 minutes.

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20. The method of claim 19, further comprising increasing the rate of increase of said pressure at a time after about one minute of application of said pressure to a final stretching pressure in said range of about 250 psi to about 500 psi.

21. A vehicle body compartment lid comprising:

a unitary panel characterized by a crease located between a first portion of the panel and a second portion of the panel;

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wherein the first portion is characterized by a plurality of strengthening formations and a plurality of openings separating the strengthening formations;

10 wherein the second portion is characterized by a contoured surface configured to form the exterior surface of the body compartment lid;

15 wherein the first portion and the second portion are in juxtaposition with one another such that the first portion functions as a structural member to support the second portion, and the second portion is configured to partially define the exterior surface of a vehicle; and

wherein the plurality of strengthening formations and the contoured surface are formed by fluid pressure.

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